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An Evaluation of Hybrid Sugarcane Varieties and Their Impact on Sustainable Productivity in Western Maharashtra

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Abstract:

Sugarcane is a major commercial crop in Maharashtra and plays an important role in the rural economy of Western Maharashtra. Despite better irrigation facilities, sugarcane productivity in the region has fluctuated due to climatic stress, pest incidence, and the degeneration of traditional varieties. In recent years, hybrid sugarcane seeds have been promoted as a technological intervention to improve yield and sugar recovery. This study examines the impact of hybrid sugarcane varieties on crop productivity using secondary data from agricultural statistics and varietal trials. The findings indicate that hybrid varieties provide a 15–25% higher yield compared to traditional varieties, along with improved ratoon performance and higher commercial cane sugar (CCS) content. The study concludes that the adoption of hybrid seeds can significantly enhance sugarcane productivity and farmer income, provided appropriate irrigation and crop management practices are followed.

Keywords: Sugarcane, Hybrid Seeds, Yield, Western Maharashtra, Agricultural Productivity

Introduction:

Agriculture plays a fundamental role in the rural economy of Maharashtra, and sugarcane is one of the most significant commercial crops because of its close linkage with cooperative sugar industries, employment generation, and rural development. The region of Western Maharashtra, which includes districts such as Pune, Kolhapur, Sangli, Satara, and Solapur, is widely recognized as the major sugarcane-producing belt of the state. The region benefits from comparatively well-developed irrigation facilities, fertile soils, and strong institutional support through cooperative sugar factories.

Despite these favorable conditions, sugarcane productivity in Maharashtra has shown inconsistent performance in recent years. Government agricultural data indicate that the average yield declined from more than 90 tonnes per hectare in 2022–23 to nearly 78 tonnes per hectare in 2023–24. These fluctuations have raised concerns regarding the sustainability and economic viability of sugarcane cultivation. One of the major factors responsible for stagnant productivity is the continued reliance on older sugarcane varieties whose yield potential has gradually declined due to genetic deterioration and increased susceptibility to pests and diseases. In response to these challenges, hybrid sugarcane varieties developed by research organizations such as Indian Council of Agricultural Research and Vasantdada Sugar Institute have gained increasing attention. These improved varieties are bred to produce higher yields, improve sugar recovery, and provide better tolerance to biotic and abiotic stresses. The present study therefore examines the impact of hybrid sugarcane seeds on crop productivity in Western Maharashtra by comparing their performance with traditional varieties.

Review of Literature:

Several studies highlight the role of improved and hybrid varieties in enhancing sugarcane productivity. Research conducted by Indian Council of Agricultural Research indicates that hybrid varieties such as Co 86032 and Co 0238 perform better than older varieties like CoJ 64 and Co 740 in terms of cane yield and

sugar recovery. Findings from multi-location varietal trials show that Co 0238 can produce nearly 20 percent higher yield under similar agronomic conditions. Studies focusing on sugarcane cultivation in Maharashtra suggest that the selection of suitable varieties significantly influences productivity levels. Research published in agricultural journals reports that farmers adopting hybrid varieties in Western Maharashtra obtain higher cane yields along with improved ratoon crop performance, which helps reduce cultivation costs. However, the literature also indicates that hybrid varieties require efficient irrigation and balanced nutrient management. In drought-prone areas or poorly managed farms, the potential advantages of hybrid seeds may not be fully realized. Thus, the effectiveness of hybrid varieties depends on the availability of complementary agricultural inputs and institutional support.

Objectives of the Study:

The main objective of the study is to examine the impact of hybrid sugarcane seeds on crop yield in Western Maharashtra. The specific objectives are to compare the yield performance of traditional and hybrid sugarcane varieties, measure the yield advantage associated with hybrid seeds, and analyze the economic and regional implications of adopting hybrid varieties in sugarcane cultivation.

Research Methodology:

The study is based on secondary data obtained from government agricultural reports, sugarcane production statistics of Maharashtra, and research publications from Indian Council of Agricultural Research and Vasantdada Sugar Institute. Data related to sugarcane yield trends were analyzed to understand productivity changes over time, while varietal trial results were used to compare the performance of traditional and hybrid sugarcane varieties. Descriptive statistical techniques were applied to calculate yield differences and percentage improvements, and the findings were interpreted with reference to the agro-climatic conditions of Western Maharashtra.

Trends in Sugarcane Yield in Maharashtra:

An analysis of sugarcane yield patterns in Maharashtra reveals noticeable variation in recent years. In 2022, the average yield was approximately 92 tonnes per hectare, which slightly declined to about 91 tonnes per hectare in 2023. A sharper decline occurred in 2024 when the yield dropped to nearly 78 tonnes per hectare. This decline has been linked to irregular rainfall, water stress during critical crop growth stages, pest infestations, and the declining performance of traditional sugarcane varieties. These trends highlight the need for improved agricultural technologies such as hybrid seeds to stabilize and enhance sugarcane productivity.

Statistical Comparison of Traditional and Hybrid Sugarcane Seeds:

To evaluate the effectiveness of hybrid seeds, a comparison was conducted between commonly cultivated traditional varieties CoJ 64 and Co 740 and widely adopted hybrid varieties Co 86032 and Co 0238 in Western Maharashtra. The comparison focuses on yield performance, sugar recovery, and resistance characteristics.

Comparative Performance of Traditional and Hybrid Sugarcane Varieties in Western Maharashtra

Parameter	Traditional Varieties *(CoJ 64 / Co 740)*	Hybrid Varieties *(Co 86032 / Co 0238)*
Average Yield (tonnes/ha)	65 – 70	80 – 85
Average Yield (kg/ha)	65,000 – 70,000	80,000 – 85,000
Yield Advantage (%)	—	15 – 25 % Higher
Ratoon Crop Performance	Moderate	High
Resistance to Pests & Diseases	Low to Moderate	Moderate to High
Average CCS (%)	9.5 – 10.0	10.5 – 11.5

(Source: Compiled from varietal trials conducted by Indian Council of Agricultural Research and reports of Vasantdada Sugar Institute.)

The comparison clearly indicates that hybrid sugarcane varieties produce higher yield, better ratoon performance, and improved sugar recovery compared to traditional varieties. The 15–25% yield advantage demonstrates the potential of hybrid seeds to enhance productivity and profitability in sugarcane cultivation.

Results and Discussion:

The comparative analysis shows that hybrid sugarcane varieties perform better than traditional varieties in several aspects. Traditional varieties generally produce an average yield of 65–70 tonnes per hectare due to varietal degeneration and greater susceptibility to pests and diseases. In contrast, hybrid varieties achieve yields ranging from 80–85 tonnes per hectare under similar conditions, indicating a productivity increase of approximately 15–25 percent.

Hybrid varieties also demonstrate improved ratoon crop performance, which is particularly beneficial in Western Maharashtra where ratoon cultivation is widely practiced. Higher ratoon yields reduce the need for frequent replanting and help lower cultivation costs. Moreover, the higher CCS percentage observed in hybrid varieties improves sugar recovery, which benefits both farmers and sugar mills. These findings confirm that hybrid seeds play an important role in increasing productivity and profitability in sugarcane farming.

However, certain limitations must be considered. Hybrid seeds are comparatively more expensive and require proper irrigation, balanced fertilizer application, and effective pest management practices. Without adequate technical support and input availability, farmers may not fully benefit from the potential advantages of hybrid varieties. Climatic uncertainties such as drought and irregular rainfall may also affect crop performance.

Conclusion:

The study concludes that hybrid sugarcane seeds have a significant positive impact on sugarcane productivity in Western Maharashtra. Hybrid varieties provide a yield advantage of about 15–25 percent over traditional varieties, along with improved ratoon performance and higher sugar recovery. These benefits contribute to increased farmer income and improved sustainability of the sugarcane sector. Successful adoption of hybrid seeds, however, depends on the availability of irrigation facilities, timely supply of quality seed material, and effective agricultural extension services. Policymakers should therefore focus on strengthening seed distribution systems and farmer training programs to maximize the potential of hybrid sugarcane cultivation.

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